THE

Saturday Magazine.

No. 580. JULY 17TH, 1841. Price One Penny.

THE SPANISH TINKER, FROM MURILLO.

MURILLO AND HIS WORKS.

II.

THE most interesting period in the life of a man of genius, is that which includes the struggles of his earlier years: we follow him through all the difficulties of his career, and our sympathy is so much excited that we almost feel our own destiny to be united with his. We rejoice at his success; sorrow at his hopes deferred; but we experience a feeling somewhat akin to disappointment, when, having attained the object of his desires, his life moves on unchequered. We sigh for more adventures; and because we look for the false excitement of romance in the soberness of biographical truth, we often cease to be interested in the remaining chapters of a life which no longer deals in stirring events.

The "gentle Murillo" appreciated too well the pleasures of calm and studious retirement to furnish the materials of personal narrative to his biographer. Our artist having attained that distinction which he merited, has recorded his life in his works, and to them we must now refer for the completion of our sketch; but so numerous are the pictures of this great man, that the notice of a very brief selection must suffice: the reader, at all interested in the subject, will not find it difficult to obtain a view of several of Murillo's pictures contained in many of the Galleries of England, especially Dulwich Gallery, which is open to the public by means of tickets furnished gratuitously at the principal print shops.

It is probably a consequence of not studying in Italy that a national peculiarity of air, habit, and countenance, pervades all the pictures of Murillo: nothing of the academy is to be discovered in his groupes; all his Madonnas and Saints have the Spanish cast of features; and though he adopts a beautifully natural expression, yet there is generally a peasant-like simplicity in his ideas, holding a middle place between the vulgarity of the Flemings, and the elegant taste of the Italians. In his rustics we behold life itself, with a minute attention to costume. Many of his figures of the Saviour are of magic lustre and transparency of hue; but still there is a certain cast and expression of features which appear strikingly provincial to any one to whom Andalusian countenances are familiar. His Baptist and his Saints, particularly San Francisco Xavier, are noble and often sublime pictures; but the sublimity of Murillo neither forces nor enlarges nature; truth and simplicity always prevail; the painter presents what he sees, and not what he conceives. Herein he is distinguishable from his preceptor Velasquez: that great master, by his courtly habits and intercourse with the great, contracted a more proud and swelling character, to which the simple and chaste pencil of Murillo never sought to aspire; a plain and pensive cast, sweetly tempered by humility and benevolence, marks his canvass; and wherever his characters are impassioned, it is by the zeal of devotion—never by the guilty passions*.

One of the finest pictures of Murillo, viz., San Thomas, of Villa Nueva, distributing alms to the sick and the poor, was exhibited a few years ago at the exhibition of the Society of British Artists.

This fine picture (says Dr. Waagen) was formerly in the Church of the Franciscans, at Genoa. It is of the second period of the master, in which, after his return from Madrid with a lively recollection of the pictures of Velasquez, he united great fidelity to nature in the design, and precision in the single forms. The subject was a peculiarly happy one for Murillo. In the head of the saint, in which priestly dignity and gravity are admirably expressed, he has proved how equal he was to such religious subjects, from the legends of the monkish saints. The cripples and the sick afforded him, on the other hand, an ample field to show his skill in representations from common life, which we so highly admire in his beggar boys. The calm intellectual action of the saint forms a striking contrast with the lively excitement of the distressed, whose whole consciousness is concentrated in their eagerness for the momentary satisfaction of their bodily necessities.

Murillo appears never to have quitted Spain,—he did not even make a second journey to Madrid: he was so much averse to pretension and display, that by the time he had attained his fifty-seventh year, his productions were scarcely known in that courtly city. But, in the year 1670, one of his pictures was exhibited there in the great procession of Corpus Christi, to the admiration and surprise of the whole court and city. The King, Charles the Second, invited Murillo to Madrid, and promised to appoint him one of the royal artists. But Murillo, whose love of retirement and attachment to his native city of Seville could not be superseded by any considerations of interest or ambition, excused himself from the proposal on account of his age. He was then requested to send to Court some specimens of his performances, equal in merit to the picture he had exhibited at the solemnity before mentioned, and was promised munificent rewards if he accepted the commission. Murillo could oppose no absolute excuse to this request, but at the same time evaded an immediate compliance by requiring a longer space of time for executing the commission than the impatience and curiosity of the king could dispense with. His majesty, therefore, employed an agent to buy up the pictures of Murillo, and thus some of the finest works of this artist found their way into the royal collection.

Murillo contributed largely to the adornment of the churches of his country. Among others, there is a fine picture at Seville, in the Christening Chapel of the Church of the Miraculous Paduan, representing the Saviour and St. Antonio under a glory of cherubims, the back ground giving the perspective of part of a temple; and by the side of the saint is a table on which is placed a jar with lilies, so accurately represented, that the monks relate the story of a small bird attempting to rest upon the flowers, to pick the seeds; a compliment which has often been paid to many an inferior artist, but which the monks enlarge upon with rapture. But, in the present case, it would be unfortunate if the fame of Murillo depended at all upon such a trifle, because the whole back ground of this picture, including the lilies, was put in by Valdez, a cotemporary artist.

To Murillo also is due the five grand compositions, exhibiting different periods in the life of Jacob. These pictures were originally in the collection of the Marquis de Villamaurigne. The first design was to embody the life of David with the landscapes or back grounds, by Ignacio Iriarte, of Seville, who excelled in that branch of the art. Murillo desired Iriarte to paint the landscapes, and he would afterwards add the figures: Iriarte, on the other hand, contended for Murillo's placing the figures before he filled up the back grounds:—to remedy this difficulty, Murillo executed the whole without Iriarte's assistance, taking Jacob's History instead of David's.

The character of Murillo and the termination of his life, are thus described by Mr. Richard Cumberland.—

Murillo was in his person graceful, of a mild and humble deportment, and an expressive handsome countenance; to the allurements of interest or ambition he was equally insensible; he resisted, as we have seen, the offers of Charles, and at his death was found possessed of one hundred rials, which he had received the day before, and sixty dollars in a drawer: he was in his seventy-third year, when mounting a scaffold to make a painting of St. Catherine, for the convent of Capuchins, at Cadiz, he fell and bruised himself so much as to bring on a violent increase of a disorder which already existed; but such was the delicacy of his nature, that being unwilling to expose his infirmity to the examination of a surgeon, he suffered in silence; and, after some days' anguish, a mortification taking place, with perfect composure he resigned a life, tinged with no other excess, but that of an inherent modesty, to which, having repeatedly sacrificed what is generally esteemed most valuable in life, he lastly gave up life itself.

* See CUMBERLAND'S *Anecdotes of Eminent Painters in Spain.*

THE PHILOSOPHY OF A PEG-TOP.

We trust that our young readers will not be disposed to spin their tops with less zest when we assure them that this toy presents a very difficult problem to the Natural Philosopher: that the theory of its motions has engaged the attention of very eminent men, and that the questions arising therefrom are by no means satisfactorily answered. The boy who loves his peg-top because it is an ingenious toy, will, we hope, be taught by the present article to regard it with a higher degree of interest; and the man (if such there be) who despises the peg-top because it is a toy, will have an opportunity of learning that much philosophy may be gathered from childish things.

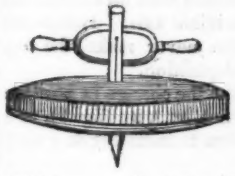
The simple contrivance whereby a top is set spinning, need not be particularly described. The string which is wound round the top and suddenly uncoiled with a jerking kind of action, has the effect of imparting circular motion to the top. Now circular motion is always the result of two forces, one of which attracts the body to the centre around which it moves, and hence is called the *centripetal* force; and the other impels it to move off in a right line from the centre, and this constitutes the *centrifugal* force. In all circular motion, these two forces constantly balance each other: if it were not so, the revolving body must evidently approach the centre of motion or recede from it, according as one or the other force prevailed. This is well illustrated by the action of a sling. When a stone is whirled round in the sling, a projectile force is imparted to the stone; but it is prevented from flying off on account of the counteracting or centripetal force of the string; the moment, however, that the string is unloosed, the stone ceases to move in a circle, but darts off in a right line; because, being released from confinement to the fixed or central point, it is acted on by *one force only, which always produces motion in a right line.*

We need scarcely inform our young reader that it is impossible for him to set up his top so that it shall stand steadily on its point without spinning it. He can never keep the line of direction within its narrow base: but when the rotating motion is once established, there is no difficulty in preserving it for a time in its erect position. Why is this? When a top is spinning we have an example of circular motion round a central axis; and the more rapidly the top spins, the greater is the tendency of all its parts to recede from the axis; or, in other words, the greater is the centrifugal force: the parts which thus revolve may be regarded as so many powers acting in a direction perpendicular to the axis; but as these parts are all equal, and as they pass with great rapidity round the axis, the top is in equilibrio on the end of its axis, or point of support, and thus its erect position is maintained. But the top soon falls, on account of two great impediments to its motion; viz., the friction of the peg on the ground, and the resistance of the air. If the top could be made to revolve on a point without friction, and in a vacuum, it would continue to revolve for ever, and always maintain the same position. But as it is impossible to comply with these two conditions, let us see what results have followed the attempts to reduce the retarding forces as much as possible.

About the middle of the last century Mr. Serson contrived a top, which, instead of the usual pear shape of the common peg-top, presented a horizontal surface similar to what we should obtain by piercing the centre of a disk of wood with an axis or peg. The upper surface of this top was polished, and it presented, while spinning, a true horizontal plane. It continued to spin for thirty-five minutes. On being spun (after the manner of spinning a humming-top), on the table of an air-pump, it was covered with a glass receiver, from which the air was then removed, and the top continued to spin during the space of two hours and sixteen minutes.

Mr. Roberts, of Manchester, a few years ago made a top which would spin in the air forty-two minutes. He made another top, and, in order to give it a neat appearance, covered it with lacquer; when he found it would not spin more than seventeen minutes; he removed the lacquer, and the top continued to spin as long as at first. He found that the lacquer, although it improves the appearance of surfaces, yet it imparts to them a vast number of minute roughnesses, scarcely, if at all, appreciable by the touch, yet sufficient to offer so much additional resistance to motion in the air.

Fig. 1.



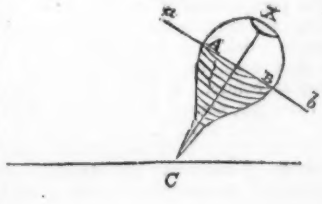
The accompanying figure represents a top made by Mr. Evans, of Swansea. Its shape is that of a disk of about four and a half inches in diameter, but rather thicker at the centre than at the edges: the central part through which the spindle passes is about an inch in thickness; and at the edge the thickness is about five-eighths of an inch. The top is put in motion like a common humming-top, by means of a yard of cord passed through the hole in the upright spindle. A rim of lead passes round the top and is inserted to the depth of about three-fourths of an inch. The steel peg on which the top spins is about seven-eighths of an inch long; it is not brought to a very fine point, because, in spinning, it is apt to drill a hole through the surface upon which it is placed. The spindle or axle is of wood, and nearly two inches long: the cord is wound tightly round this spindle; one person holds the two handles firmly, and a second draws out the cord to its full length. The cord should not be drawn out too rapidly at first, but with a speed gradually increasing. The best surface to spin it on would probably be a small agate cup, but, in the absence of this, we may employ a plate or saucer, over which a little oil has been rubbed. Mr. Evans says, "that by a simple contrivance, namely, sticking a knitting-needle through a reel of fine cotton, containing 250 yards, and attaching it to the top at full speed, I have been enabled to ascertain to a great nicety the speed of mine that spins forty minutes; the cotton was run off the reel in somewhat less than one minute; and from frequent trials, I find it makes no less than 4500 revolutions in the minute."

We will now return to the common form of the peg-top, and endeavour to explain the means by which the top is enabled to rise from the oblique position (which it always more or less assumes when first set spinning,) into the truly vertical position which produces the effect called *sleeping*, where the motion is so steady that it scarcely seems to move.

When the top is *sleeping*, its centre of gravity is situated perpendicularly over its point of support; but, in rising from an oblique to a vertical position, the top must have its centre of gravity raised. The force which effects this change has been a subject of contest in the philosophy of the peg-top, and we believe that Dr. Paris was the first to offer a satisfactory explanation thereof. He considers it to depend upon the form of the extremity of the peg, and not upon any simple effect connected with the rotatory or centrifugal force of the top. If the peg were to terminate in a fine, that is to say, in a mathematical point, the top never could raise itself.

Let A, B, C, (fig. 2,) be a top spinning in an oblique position, having the end of the peg C on which it spins brought to a fine point. It will continue to spin in the direction in which it reaches the ground, without the least tendency to rise into a more vertical posi-

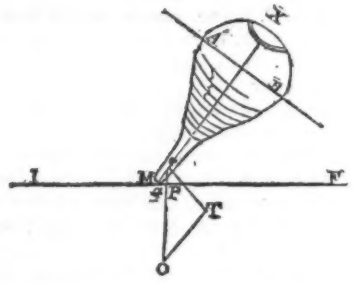
Fig. 2.



tion, and it is by its rotating or centrifugal force that it is kept in this original position: for if we conceive the top divided into two equal parts, A and B, by a plane passing through the line X C, and suppose that at any moment during its spinning the connexion between these two parts were suddenly dissolved, then would any point in the part A fly off with the given force in the direction of the tangent, and any corresponding point in the part B with an equal force in an opposite direction; whilst, therefore, these two parts remain connected together, during the spinning of the top, these two equal and opposite forces, A and B, will balance each other, and the top will continue to spin on its original axis. Hence the rotating or centrifugal force can never make the top rise from an oblique to a vertical position.

But in order to be satisfied that the change in position depends on the bluntness of the point, let A B C (fig. 3), be a top spinning in an oblique position terminating in a very

Fig. 3.



short point with a hemispherical shoulder P *a* M. It is evident that in this case, the top will not spin upon *a*, the end of the true axis X *a*, but upon P, a point in the circle P M to which the floor I F is a tangent. Instead, therefore, of revolving upon a fixed and stationary point, the top will roll round upon the small circle P M, on its blunt point, with very considerable friction, the force of which may be represented by a line, O P, at right angles to the floor I F, and to the spherical end of the peg of the top: now it is the action of this force, by its pressure on one side of the blunt point of the top, which causes it to rise in a vertical direction. Produce the line O P till it meets the axis C; from the point C draw the line C T perpendicular to the axis *a* X, and T O parallel to it; and then, by a resolution of forces, the line T C will represent that part of the friction which presses at right angles to the axis, so as gradually to raise it in a vertical position; in which operation the circle P M gradually diminishes by the approach of the point P to *a*, as the axis becomes more perpendicular, and vanishes when the point P coincides with the point *a*, that is to say, when the top has arrived at its vertical position, where it will continue to *sleep* without much friction, or any other disturbing force, until its rotatory motion fails, and its side is brought to the earth by the force of gravity.

There can be no doubt that this explanation is correct, and however difficult it may appear to the general reader, yet it is worthy an attentive consideration. The following remarks by Dr. Arnott will greatly tend to illustrate and simplify the theory of Dr. Paris.

While the top is quite upright, the extremity of its peg, being directly under its centre, supports it steadily, and although turning so rapidly, and with much friction, has no tendency to move from the place; but if the top incline at all, the *edge* or *side* of the peg, instead of its very *point*, is in contact with the floor, and the peg then becoming as a turning little roller, advances quickly, and describes a curve somewhat as a skaiter's foot does, until it come directly under the body of the top as before. It thus appears that the very fact of the top inclining, causes the point to shift its place, and to continue moving until it come again directly under the centre of the top. It is remarkable that even in philosophical treatises of authority the standing of a top is still vaguely attributed to *centrifugal force*. And some persons believe, that a top spinning in a weighing scale, would be found lighter than when at rest; and others most erroneously hold that the centrifugal force of the whirling, which of course acts directly away from the axis, and quite equally in all directions, yet becomes, when the top inclines, greater upwards than downwards, so as to counteract the gravity of the top. The way in which centrifugal force really helps to maintain the spinning of a top is that when the body inclines or begins to fall in one direction, its motion in that direction continues until the point describing its curve, like the foot of a skaiter, has forced itself under the body again.

The gyrations of the peg-top depend upon the same principle as that which produces the precession of the equinoxes; viz., an unequal attractive force exerted upon the revolving mass. In the one case, this is known to arise from the action of the sun and moon on the excess of matter about the equatorial regions of the earth; in the other, from the parts of the top being unequally affected by gravity while it is spinning in an inclined or oblique position. Sir John Herschel says:—

The precession of the equinoxes consists in a real, but very slow motion of the pole of the heavens among the stars, in a small circle round the pole of the ecliptic. Now this cannot happen without producing corresponding changes in the apparent diurnal motion of the sphere, and the aspect which the heavens must present at very remote periods of history. The pole is nothing more than the vanishing point of the earth's axis. As this point, then, has such a motion as described, it necessarily follows that the earth's axis must have a conical motion, in virtue of which it points successively to every part of the small circle in question. We may form the best idea of such a motion by noticing a child's peg-top, when it spins not upright, or that amusing toy the te-to-tum, which when delicately executed, and nicely balanced, becomes an elegant philosophical instrument, and exhibits in the most beautiful manner, the whole phenomenon, in a way calculated to give at once a clear conception of it as a fact, and a considerable insight into its physical cause as a dynamical effect.

The following ingenious and useful remarks we borrow from Dr. Paris.

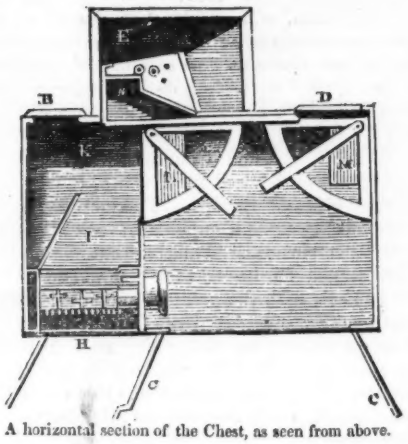
If a top could be made to revolve on a point without friction, and in a vacuum, in the case of its velocity being *infinite*, it would continue to revolve for ever, in the same position, without gyration. If the velocity were *finite*, it would for ever remain unchanged in position, in the event of the centre of gravity being directly over the point of rotation. In any other position (supposing its velocity very great, although not infinite) there would arise a continued uniform gyration, the line which passes through the point of rotation and the centre of gravity always making the same angle with the horizon, or describing the same circle round the zenith. But in all artificial experiments the circumstances are very remarkably changed; if, indeed, the centre of gravity happens to be situated perpendicularly over the point of rotation, the top will continue quite steady, or *sleeping*, as it is termed, till nearly the whole of its velocity of rotation is expended. In any other position the top begins to gyrate, but reclining at all times on the outside of its physical point of gyration, the top is uniformly impelled inwards, and this, (when the velocity is considerable, and the point broad,) acts with force sufficient for carrying the top towards its quiescent or *sleeping* point; but when the velocity is much diminished, this power becomes feeble, the gyrations increase in diameter, and the top ultimately falls.

As the peculiar office of man is to govern and defend society; that of woman is to spread virtue, affection, and gentleness through it: she has a direct interest in softening and humanizing the other sex. Man is too rugged to be even just towards those whom he only loves, but does not respect: he is too powerful to be swayed by those whom he only respects, but does not love. The empire of woman must be won, not solely through his sense of justice, but by the grace and delicacy, the tenderness and purity she diffuses through life; but her rights will neither add dignity to her social influence, nor bring practical security to her domestic station, except as they are found really to promote the virtue and happiness of society.—*Woman's Rights and Duties.*

ON CHESS. No. XIV.

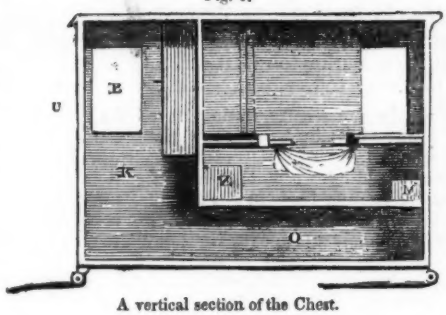
The Automaton Chess-Player. 2.

Fig. 3.



A horizontal section of the Chest, as seen from above.

Fig. 4.



A vertical section of the Chest.

We propose on the present occasion to describe the external appearance and the mode of performance of the chess automaton, as detailed by M. Windisch soon after its first introduction to the public. The reader will fancy himself a visitor to M. de Kempelen's study, as described in our last article.

The first object that catches the eye on entering this room is the automaton, placed opposite the door. The chest to which it is fixed is three and a half feet long, two feet deep, and two and a half feet high. It stands upon four castors, by which means it may be easily moved from one place to another. Behind this is a figure, the size of life, dressed in the Turkish fashion, seated in a wooden chair, attached to the chest, and which moves with it when it is wheeled about the room. This figure leans with its right arm upon the table, and in its left hand holds a Turkish pipe, in the attitude of a person who has just been smoking. It plays with its left hand,—a circumstance which the inventor says was due to his own inattention, and not discovered until the work was too far advanced to rectify it. "But what does it signify," asks Windisch, "whether Titian painted with his left hand or his right?" Before the automaton is a chess-board, screwed down to the table, to which its eyes are constantly directed. M. de Kempelen opens the front door of the chest and takes out the drawer at the bottom. The chest is divided by a partition into two unequal parts: that on the left hand is the narrower; it occupies little more than one-third of the chest, and is filled with wheels, cylinders, levers, and other pieces of clock-work. In that on the right are also seen some wheels, spring-barrels, and two horizontal quadrants. There is also a box, a cushion, and a tablet, on which are traced some characters in gold. The inventor takes out the box, and places it on a small table standing near the machine: he also removes the tablet, which is to be placed on the chess-board as soon as the game is over, to enable the automaton to answer such questions as may be put to him.

In the drawer above-mentioned are red and white chess-men on a board, with which they are taken out and placed on the side of the chess-board. There is also a small oblong box, containing six small chess-boards, each showing the end of a game. Any one of these situations being set up on the automaton's chess-board, he undertakes to win, whether he play with the red or the white men.

In showing the interior of the machine the inventor not only opens the front but also the back doors of the chest, by which the wheel-work becomes so exposed as to afford the most thorough conviction that no living being can possibly be concealed; and in order to make this exposure more complete, the inventor generally places a wax light in the chest, so as to illuminate every corner of it. He then lifts up the automaton's robe, and turns it over his head, so as to display the internal structure, which consists of levers and wheel-work, of which the body of the automaton is so full that there is not room to hide a kitten. Even his trousers have a little door in them, which is opened to remove even the shadow of suspicion.

M. de Windisch assures us that the inventor does not shut one door as soon as he opens another,—"no, you see, at one and the same time, the uncovered automaton, with his garments turned up; the drawer and all the doors of the chest open." In this state the inventor moves it about, and submits it to the inspection of the curious.

After allowing sufficient time to examine it closely he shuts all the doors, and places it behind a balustrade, which prevents the company from shaking the machine by leaning upon it while the automaton is at play, and leaves room for the inventor to walk about, and approach the cupboard on either side, but he never touches it except to wind up the works. He then introduces his hand into the body of the automaton, in order to arrange the movements properly, and concludes by placing a cushion under that arm of the automaton with which he plays.

The inventor places the little box (before spoken of) on a table near the machine: there is, however, no visible communication between the automaton and the table or the little box; but while the automaton is playing, the inventor frequently opens this box, to examine its contents, which are unknown to the company. It was generally supposed that this box was merely a plan calculated to distract the attention of the spectators, but the inventor assured M. de Windisch that it was so indispensable that the automaton could not play without it.

We are now prepared to see the machine play. When the automaton is about to move he lifts his arm leisurely, and directs it to the piece which he intends to play: he suspends his hand over it,—opens the fingers,—takes it,—places it on the proper square,—and again removes his arm to the cushion. In capturing a piece he first removes his adversary's man, and then substitutes one of his own. A slight noise of wheel-work, somewhat resembling that of a repeater, is heard during every move of the automaton. This noise ceases as soon as a move is made and the automaton's arm replaced on the cushion; and not till then can the adversary make a fresh move. The automaton always claims first move, and moves his head so as to look over the whole board whenever the adversary makes a fresh move. He nods his head twice when the adverse queen is attacked, and thrice when check is given to the king.

If the adversary makes a wrong move, the automaton shakes his head, returns the piece to the square from which it had moved, and then plays his move; so that the adversary loses his move as a punishment for his inattention or wilful mistake: this often happens, from a desire on the part of the player or the company present,

to see the automaton detect a mistake, and take advantage of it. This condition is one among others which facilitates the winning of games by the automaton.

The inventor requests those who play with the automaton to be careful to place the pieces exactly in the middle of the squares, lest the automaton in opening his hand to take the piece should miss it, or receive some damage. A move once made on either side is not allowed to be retracted.

The machine cannot make above ten or a dozen moves without being wound up again; but it is evident that the simple operation of winding up the springs of the arm of the machine can produce no other effect than that of restoring to it the *vis motrix*, without having any influence on its *vis directrix*. In this latter quality consists the principal merit of the machine, and here also lies the mystery: for the operation of winding up is the only one the inventor is seen to perform, and this the only time when he touches the machine. Mathematicians of all countries have examined it with the most scrupulous attention without being able to discover the least trace of its mode of operation.

I have frequently been in the apartment, (says Windisch,) where the automaton was at play, with twenty or thirty more persons, who kept their eyes rivetted on the inventor. We never saw him approach within two or three yards of the machine, nor do aught else than look occasionally into the box before mentioned; nor ever betray himself by the least motion which to us appeared capable of influencing the machine in any shape whatever.

To show also that magnetism has nothing to do with the movements of the chess automaton, the inventor permits any one to place the most powerful magnet on the machine.

The automaton also performs the feat of moving the knight over the sixty-four squares of the chess-board in as many leaps. One of the spectators places a knight on any square: the automaton immediately takes it, and observing the knight's peculiar move, begins at the square occupied by the knight, and causes the piece to cover the sixty-four squares in the same number of moves without missing one, and without touching one square twice: this is ascertained by one of the spectators putting a counter on each square he touches.

Such, then, is an account of the appearance and performances of the chess automaton, as exhibited soon after its first invention. We have given our description in the present tense, as being better calculated to afford the reader an idea of the extraordinary sensation caused by this very remarkable machine.

Of all his inventions M. de Kempelen prided himself least on his automaton chess player. He frequently spoke of it as a mere trifle, and though considering it merely as a machine, (without reference to the plan adopted for putting it in motion,) it certainly possessed some mechanical merit, yet that the greater part of the reputation it had acquired was owing to a happy deception.

M. de Kempelen was far from coveting the celebrity which his automaton obtained for him, nor did he desire that it should be considered as a prodigy. He wished it to be understood that the wonderful effects of his machine were due to a certain boldness of thought on his part, and a happy choice of means employed in the deception. He was unwilling to part with his secret, and refused considerable offers made to him by persons who hoped to make their fortune by exhibiting it. He even threw aside the automaton in order to devote his mechanical abilities to new researches and inventions of a more serious nature, and more calculated for public utility; and although frequently visited by travellers from different countries, who wished to see his famous automaton, he declined showing it, stating that it had received damage in being moved about from place to place. He had, in fact, partly taken it to pieces, and left it for some years in a dilapidated state, in which condition it would have remained, but for the following circumstance:—the Grand Duke Paul of Russia, with his consort, under the travelling titles of the Count and Countess du Nord, paid a visit to the Emperor Joseph the Second, at the Court of Vienna, who, wishing to gratify as much as possible his distinguished guests, bethought himself of de Kempelen's machine. In compliance, therefore, with the desires of his sovereign, de Kempelen got the automaton into working order within the space of five weeks. It excited the greatest surprise and admiration in the minds of the Count and Countess, who, as well as the principal nobility, advised the inventor to send it to some of the chief cities of Europe. The emperor approved of this plan, and gave de Kempelen leave of absence for two years for that purpose. The chess automaton was therefore despatched on [its travels. In 1783 it first appeared at Paris with the greatest applause: it was beaten at chess by the professors at the Café de la Régence, but this circumstance by no means detracted from the merit of the machine, if such we may call it; nor did it tend to elucidate the mystery which was the grand cause of the excitement, which everywhere attended the presence of this automaton.

De Kempelen found the automaton so profitable an exhibition in Paris that he determined to visit London, where we hope to find him in our next article at No. 8, Savile Row, Burlington Gardens.

IN no province of science, in no part of the vast and diversified scenery of nature, are the various attributes of God more wonderfully and impressively displayed than upon the bright field of astronomy. In the contemplation of the brilliant scenery of the starry heavens, the man whose mind is stored with the rich and varied results of modern discovery has an advantage over those who are uninitiated into these sublime mysteries of nature, attended with correspondent obligations of piety and devout admiration. When an ignorant and uninstructed person looks up to the ethereal concave, he sees nothing but a vast canopy mantling the globe on which he dwells, and studded with so many spangling points. To him it is nothing but a scene of gay confusion, in which he can discover no law beyond that of a periodical appearance above the horizon, nor conceive any end suitable to the variety and the magnitude of the means which seem to have been employed. But the man of science sees with other eyes; he looks up to that glorious theatre of wonders, which has been spread above him and around him, with other notions, and, unless his mind be blinded by prejudice, and incased in impiety, he cannot fail to be led to other reflections. Where the untaught eye saw nothing but a promiscuous assemblage of twinkling lights, he beholds the most perfect regularity, harmony, and order. Where the ignorance of the former could perceive only the dispositions and arrangements of chance, his knowledge can trace the footsteps of the most consummate design. To his enlightened vision the speck enlarges into a world, and the spark swells into a luminary. While conducted by the hand of science, he ranges over the fields of ether, and follows the planets in their course; while he contemplates these vast bodies wheeling through the sky, under the influence of a combination of forces, which can be reduced to the laws of the most rigid demonstration, spinning each upon its own axis, and at the same time travelling with inconceivable velocity along its orbit; while he passes on from star to star, from system to system, the centre of one being probably only a planet moving with its attendant satellites around some more distant centre: and when the line of scientific observation having now failed him, his imagination takes the helm and conducts him among those remoter worlds, which as he advances are found to rise in thicker clusters over the face of the abyss; while he is engaged in this voyage of discovery, or rather in this tour of observation over the manifold works of God, at every step must be rising higher his conceptions of the power and majesty, of the wisdom and goodness of that Being, the very threshold of whose dominions he has scarcely been able to pass. Overwhelmed with the immensity and variety of the objects of his contemplation, he sinks down in the conscious acknowledgment of his littleness, and seeks repose to his wearied faculties in the homage of silent adoration.—DAVIES'S *Handmaid.*

BEET-ROOT SUGAR.

1. The Varieties and Cultivation of the Beet.

We often find that plans formed by individuals for the gratification of their own private ends lead to results which they little contemplated, and which frequently tend to the public good; thus, Bonaparte, influenced by bitter hatred towards England, strove to cripple her commerce by endeavouring to render France quite independent of the British colonies in obtaining a supply of the necessaries of life. One of his plans was to obtain sugar from *Beet-root*, and although the feeling with which this plan was prosecuted has long since passed away, yet the results of numerous experiments made in conformity with it belong to the cause of science, and can neither be forgotten nor despised.

Nearly a century ago, Margraf, a German chemist, found that sugar may be obtained from the white beet-root in greater quantity than from any other European plant. Achard and other experimentalists subsequently investigated the subject, with a view to determine the best mode of obtaining sugar from the beet. It will, therefore, be desirable to preface our notice of this branch of industry with a brief account of the principal varieties of the beet, in order to indicate the qualities in which the white variety differs from the others.

The botanical name for beet is *Beta*, so called from the resemblance which the plant is thought to bear, while the seed is swelling, to the form of the Greek letter β. It is ranked among the class *Pentandria*; order *Digynia*. There are three or four species, each of which presents several varieties. The *Beta cicla*, or common culinary beet, includes the common green-leaved beet, the large white beet, and the chard, or great Swiss beet. The *Beta major*, or *Great German Beet*, commonly called *Mangel-wurzel*, presents the dark-green-leaved, the light-green-leaved, and the red-veined-leaved varieties. Lastly, there is the *Beta rubra*, which includes the common red beet and two or three other varieties nearly allied to it. The principal features presented by these three species are the following:—The *Beta cicla* has a small oblong white root, producing from its crown many large, oblong, succulent leaves, on broad foot-stalks, and erect branching seed; stems two or three feet high, garnished with close setting leaves, and long spikes of greenish flowers, which are succeeded by plenty of ripe seed in autumn. The *Beta major* has a large, long, reddish, or sometimes whitish-red root; and very large, oblong, thick, succulent, leaves. The *Beta rubra* presents a large red eatable root, crowned by many large, oblong, reddish-purple leaves; and when it shoots, sends up erect stalks and branches, terminated by long spikes of flowers and seed.

The purposes to which these varieties of beet are applied, or rather, we should say, the modes in which they have been applied as food, are many. In some instances the root itself is cut up and eaten; in others, the stalks and mid-rib of the leaves are stewed and eaten like asparagus; in a third kind the leaves, being large and succulent, are occasionally used in the manner of common beet, and particularly to boil as spinach, or to put into soups. As food for cattle, the variety termed *mangel-wurzel* has been much used of late years; and the reader may frequently see, on the pier or quay of Hungerford market, immense heaps of this root, landed from barges and vessels, for the London market.

It does not form part of our plan to extend farther the notice of beet generally; but we shall now proceed to the consideration of the mode in which one particular variety of the plant is cultivated, for the production of sugar. The researches of Achard and Gottling have combined to educe a regular and systematic train of operations.

Achard recommends that the soil for the growth of the beet should be one in which wheat has been grown. A low situation, not exposed to great or lasting drought, is to be preferred. The ground should be ploughed thrice over, and as deep as the nature of the soil will admit. Immediately after the third ploughing, which should be done in April or the beginning of May, the ground is to be brought smooth by the harrow; and by means of a rake, whose teeth are distant from nine to twelve inches, lines are to be traced along the surface. Then, by drawing the rake in transverse lines across these, the ground becomes divided into squares, measured by the distances of the rake's teeth. Into each intersecting point of the lines thus drawn, one capsule containing several seeds is to be inserted, to the depth of an inch; a process which may be easily attended to by children. When the plants have germinated and six or eight leaves are formed, the ground must be weeded, and if the young plants be too much accumulated on a particular spot, the superabundant ones are to be pulled out. After the ground has been once cleared of the weeds, the plants grow up so speedily, that their leaves soon completely cover the ground; and thus absolutely prevent the growing of any more weeds. In consequence of this circumstance, an acre of ground cultivated with beet occasions no more trouble till the time of gathering; which circumstance greatly facilitates the cultivation, because the time of the cultivator, who is then busied in his corn harvest, is not required to be at all employed on this object.

Respecting the choice of seed, care must be taken that it be not obtained from roots which, after their germination, have been transplanted on seed-beds; but from such as remained on the spot where they grew from the capsules, till autumn, and which likewise have produced the true oblong, thin, conical roots, the best suited for preparing sugar. This is necessary, because the seed of untransplanted beet produces roots more partaking of the spindle form, which, as we have remarked, is that which has been found most profitable.

Among those varieties of the beet which have that shape of root deemed most favourable for the production of sugar, Achard enumerates four of different colours. Some have a pale red rind, and are internally quite white; others, with a rind usually of a deeper red, have internally reddish stripes; others again, of a more or less deep red, have red circles; and lastly, there are some which, with a rind almost white, have the internal parts yellow. These varieties have different degrees of value, in the preparation of sugar. That which is white, with a light red rind, deserves the preference above the others, yielding much sugar, and an agreeably sweet syrup. The red-striped or circled roots, whose rind is of a darker colour than the kind just spoken of, afford sugar; but the syrup is bad, on account of its retention of the taste of the root, which cannot be removed but by expensive chemical processes. Those with a white rind and yellow interior afford much crystallizable sugar; but are not calculated for the production of moist or raw sugar, on account of the exceedingly disagreeable taste of the syrup.

Achard made some very ingenious inquiries into the effect of *light* on the developement of a saccharine principle in the beet. It is known that asparagus becomes more sweet and pleasant to the taste when kept excluded from the light than when exposed to it. Endive, too, has a tough harsh-tasted leaf when exposed to the free action of light; whereas, when the inner leaves are defended, by tying the outer ones together, they change their colour, which passes from green to yellow; the firmness of their texture is weakened; they become tender, soft, brittle, and full of juice; and their taste, which was before exceedingly disagreeable, becomes mild and pleasant. Reasoning from these facts, he inquired, not only whether any particular principle, such as the saccharine, was affected by light, but also whether all parts of a plant were similarly affected, or whether differ-

ent members of the plant. His researches led him to these two conclusions:—1. That the absence of light augments the saccharine liquor in almost all roots, or in the genus arising therefrom; that its presence diminishes it; and that to shade the whole surface of a piece of ground, on which such roots are raised, adds very much to the increase of their saccharine matter. 2. That light has not the same effects on the different parts of the same plant; for, in the case of the *fruit*, so far from being influenced in the same way as the root, the saccharine matter is augmented by the presence of light, and, on the contrary, is not only retarded but diminished by the absence of light. As a further support of his opinion, he states that the upper parts of carrots, parsnips, beet, and other vegetables, which are not covered by the earth, lose the sweet taste naturally belonging to them; while the root, which is enveloped in the ground, possesses much of the saccharine principle.

The way in which Achard proposes to take advantage of these effects is, to shield as much as possible the beet root from the action of light during growth, and to expose the upper part of the plant freely to its influence, in order that the saccharine principle, naturally belonging to the plant as a whole, may settle down more and more completely in the root. It is for a similar reason, that he prefers the spindle-shaped roots to those of a more globular form, as being more likely to keep from the influence of light. Of the different varieties of root which were tried, Achard found sugar to result more abundantly from those which were of small size, and consequently had grown near one another; or whose heads had been buried underground; or which had flat heads, and therefore, from which the leaves had not been taken off; or, finally, which possessed a conical or spindle-shape, and had not been transplanted, but had received their full growth in the places where they germinated from seed. On the contrary it was found that only pulp and ill-tasted syrup were formed from roots which were strong and thick, and consequently grew at a greater distance from one another, or from those whose heads were large and round.

It therefore appears, that in order to produce roots which shall yield a remunerating quantity of saccharine matter, the plants should be planted with that degree of proximity to each other, that the leaves shall spread over the whole surface of the ground, and form a kind of umbrageous canopy. These leaves are not to be cut until about the month of September or October, when the root itself is taken up.

The reader will then understand, that according to the experience of Achard, the cultivation of the beet for the production of sugar is not a difficult process, considered in an agricultural point of view; but that care is necessary to keep the root excluded from the action of light. The plant will then attain, by the month of October, the condition which is required for this purpose. We shall in another paper, therefore, trace the routine of processes by which the sugar is obtained from the beet-root.

HYMN.

God of Nature, God of love!
Seen below, around, above,
Traced in every varied form,
Heard in every awful storm;
Glorious in the noonday light,
Mild and beautiful in night;
Now, O bounteous Lord! to Thee,
Low we bend the suppliant knee.
'Tis thy goodness glows around,
Decks the fields, and clothes the ground;
'Tis thy breath, in gentle gales,
Sweeps along the dewy vales;
'Tis thy bounteous hand distils
Healthful waters from the hills;
To Thee, O God! our lives we owe,
And every blessing here below.

THE TRUE USE OF TALENT.

THERE can be no doubt that the great primary end, to which every man of talent should consider his powers, in whatever line of intellect or attainment they may predominantly lie, as solemnly and sacredly pledged, is the promotion of the glory of the great Author of his being. This was the very object for which such an order of mind was bestowed upon him, and proportioned to the superior energy and capability of that mind is unquestionably the force of the obligation by which he is bound to give its exertions a sound and salutary direction. This is the central point, to which every ray throughout the whole circle of human endowments should steadily and uniformly converge. It is true indeed that the object may be promoted in various ways—that it may be advanced by different habits and modifications of intellectual exercise. In establishing the glory of the Deity as the great standard to which all the efforts of the mind should be ultimately referred, there is no necessity that the faculties should be cramped in their exercises—that they should be confined in their attainments, partial in their application, and timid in their researches. With this object, on the contrary, their most unfettered developement—their most extensive and loftiest excursions, so far from being incompatible, are in the highest degree congenial. In the grand system of the moral universe, while the glory of its Author, as the sun, occupies the centre, there is range enough both for the flaming comet, which wheels through its distant round—still however paying the homage of a strict and undeviating gravitation—and for the milder planet, which appears to pursue a more regular and uniform course. Whatever may be the amount of the talents which any individual has received, there is abundant scope for their exercise, and for carrying on such a profitable negotiation in the varied intercourse of human society, as may enable him, on the great day of account while he feels himself to be at best an unprofitable servant, to return them, in the language of the parable, with usury to Him that gave them. As the scenes of nature are infinitely diversified—as its laws require to be investigated and its beauties to be displayed, by the exercise of appropriate powers of mind, and as the attributes of Deity admit of various modes of illustration, there is obviously opportunity afforded for the developement of every order of talent, and for the indulgence of every pure and well-regulated taste, while the end is still uniform and the same. Science, history, philosophy, poetry, and the fine arts may be cultivated in all their departments with all the enthusiasm which the most devoted adherent of these pursuits may desire, without any necessary dereliction of that primary design to which they must all be subordinate. The intellect may prosecute its researches and delight itself with the discoveries of truth; the judgment may arrange her materials and form them into trains of reasoning; the memory may accumulate her treasures and make still fresh additions to her stores; the imagination may embody her visions, and fancy may weave her garlands; while the eye of the mind is still firmly fixed upon that which gives a character of sacredness to every effort. All that is really wanted is simplicity of purpose and a sublime rectitude of aim. The spirit of man was never designed to be stretched upon a Procrustean bed, to the form and dimensions of which the elastic powers of the soul are to be rigidly adapted and measured. But while the mind may justly assert its native liberty of action—while it may refuse to have its kindling energies smothered beneath the choking layers of antiquated notions and predilections, and to shape its conceptions into a servile conformity to the model of prevailing and ordinary sentiment—while it is privileged to expatiate with freedom over the varied field of thought, there must still be a point with which it will be found to move in harmony. Though it may rise above the influences of earth, there must still be a luminary in the heavens—there must be a fixed, a never-varying regard to the glory, the majesty, the will and the purposes of its beneficent Creator, whose sway it must unreservedly own; and until it has been brought under this legitimate and salutary control it is as incapable of guiding itself aright as the fabled Phaeton of directing the chariot of the sun.—DAVIES'S *Handmaid.*

LONDON:
JOHN WILLIAM PARKER, WEST STRAND.
PUBLISHED IN WEEKLY NUMBERS, PRICE ONE PENNY, AND IN MONTHLY PARTS, PRICE SIXPENCE.
Sold by all Booksellers and Newsvenders in the Kingdom.